(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
6 December 2001 (06.12.2001)

PCT

(10) International Publication Number
WO 01/91966 A1

(51) International Patent Classification[7]: B23K 37/053

(21) International Application Number: PCT/CA01/00781

(22) International Filing Date: 30 May 2001 (30.05.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2,310,376 1 June 2000 (01.06.2000) CA

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(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

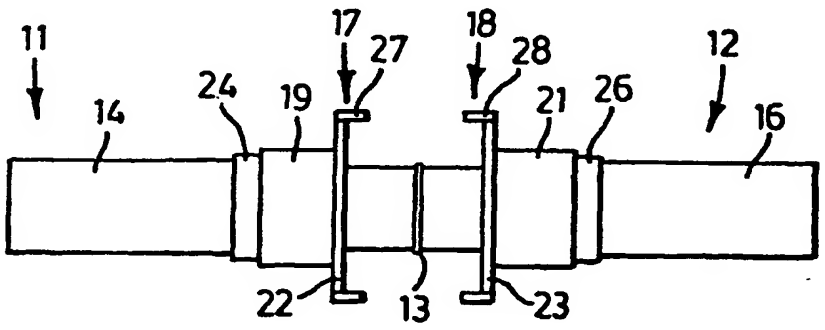
(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHOD AND APPARATUS FOR USE IN APPLYING HEATING

WO 01/91966 A1



(57) Abstract: A applying heating on a pipe or other elongate tubular article, a heat shield is applied on the article at each side of a zone to which the heating is to be applied. Each heat shield has a wholly or partially cylindrical portion extending in a circumferential direction of the article, and a planar portion that extends radially outwardly from an inner end of the cylindrical portion.

Method and Apparatus for Use in Applying Heating

The present invention relates to methods and apparatus for use in applying heating particularly on a zone of an elongate tubular article, for example when installing heat shrink products such as heat shrinkable sleeves on coated pipes.

Certain field-applied coatings require heating the substrate prior to installation. Heat shrinkable sleeves virtually always require this, particularly when the functional coating is a hot melt adhesive. The most common and convenient way to install heat-shrinkable sleeves to a weld-joint is to use a high intensity flame, most typically with the use of a propane torch. Unfortunately, some pipeline coatings are easily damaged if a flame is directly impinged onto them. Two common examples of heat-sensitive coatings are polypropylene coatings and coal-tar enamel coating.

Recently, sleeves have been designed for application to the field joints on polypropylene-coated pipe. Such sleeves and procedures for applying them are described in applicant's co-pending Canadian patent application serial No. 2,308,802 filed May 18, 2000. With this system, preferably the steel is preheated to a temperature of at least 180°C, and more preferably 200°C. For smaller pipes, this is accomplished using propane or LNG torches trained directly on the steel by the installers. This creates a number of concerns in practice:

1. While it is important to warm the polypropylene pipe coating, polypropylene decomposes readily when exposed directly to the heat of such a flame. The result is the generation of waxy materials to which the sleeve will not adhere.

2. Polypropylene coating compounds contain

significant amounts of thermal and UV stabilizers. These are rapidly depleted by exposure to a direct flame.

3. If the polypropylene coating is heated to too high a temperature, it and the underlying hot-melt adhesive will melt, resulting in shrink back, warping, and in severe cases actual flow.

4. In windy conditions, it is difficult to focus the heat accurately on the weld joint, making it very difficult to achieve uniform temperature.

5. In windy conditions, much of the energy is lost to the wind, increasing significantly the length of time and amount of fuel required to achieve the required temperature.

It is known to cover exposed coating with fireproof blankets to prevent damage from welding sparks, and these have also been used to prevent direct exposure to flame during preheating, and even during shrinking. However, these procedures are not entirely satisfactory and it would be desirable to provide methods and apparatus that accomplish one or more of the following:

1. Protect the pipe coating from being damaged by the flame.

2. Insulate the coating, so that heat travelling through the underlying steel and up through the coating will provide a more uniform temperature distribution in the coating.

3. Trap the heat within the joint area, thereby reducing substantially the time and fuel requirements to heat the joint, particularly on a windy day.

In accordance with the invention there is provided a method for use in applying heating on a zone of an elongate tubular article comprising applying a heat shield on the article at each side of a zone to which the heating is to be applied, each heat shield comprising an at least partially cylindrical portion extending in a circumferential direction of the article and a planar portion extending radially outwardly from an inner end of the cylindrical portion.

The shields may be installed over an insulating fireproof blanket, which may be wrapped around a pipe coating at either end of a weld joint.

The invention also provides apparatus for use in applying heating on a zone of an elongate tubular article, comprising two similar heat shields each comprising an at least partially cylindrical portion adapted to extend in a circumferential direction of the article and a planar portion extending radially outwardly from an inner end of the cylindrical portion.

The invention will now be described in more detail, by way of example only, with reference to the accompanying drawings, wherein

Fig. 1 is a partially schematic side view showing a pipe joint together with apparatus in accordance with the invention for use in applying heating thereto;

Fig. 2 is a view similar to Fig. 1 showing a modified form of the apparatus;

Fig. 3 is a partially schematic end view of a heat shield suitable for use in the apparatus of the invention, and

Fig. 4 is a partially schematic axial section through

the heat shield of Fig. 3.

Fig. 1 shows pipe sections 11 and 12 welded together at a weld joint 13. It may be desired to apply a heat shrinkable sleeve covering the exposed bare metal of the pipe sections 11 and 12 adjacent the weld joint 13.

Outwardly from the joint 13, each pipe section 11 and 12 has a polyolefin, for example polypropylene pipe coating 14 and 16 thereon.

In this invention, applied over each pipe section 11 and 12 at each side of the zone of the joint 13 is a heat shield, 17 and 18, respectively. Each heat shield 17 and 18 may comprise a cylindrical tubular portion 19 and 21, each preferably of diameter somewhat greater than the outside diameter of the coated pipe sections including the coatings 14 and 16, so that there is an annular space between the inside of the sections 19 and 21 and the coatings 14 and 16.

Each section 19 and 21 has an annular flange 22 and 23, respectively, connected on its axial inner end.

In the preferred form, the heat shield 17 and 18 are installed over an insulating fireproof blanket 24 and 25, which is applied, for example is wrapped, around the pipe coating 14 and 16 at either end of the weld joint. The tubular portion 19 and 21 encloses the pipe 11 and 12, and at least a part of the blanket 24 and 25. Conveniently, the blanket 24 and 25 may be connected to a radially inner side of the cylindrical portion 19 and 21.

In use, when heat is applied to the zone exposed between the flanges 22 and 23, for example in the course of shrinking a heat shrink sleeve onto the area of the weld joint 13, the flanges 22 and 23 prevent hot gases from the torch from escaping from the region of the weld joint 13

that the two flanges 22 and 23 enclose. This not only prevents the heat from impinging on the pipe 11 and 12 outside this area, but also improves heat transfer to the weld joint surfaces.

Fig. 2 illustrates a modified form of heat shield, wherein a cylindrical edge flange 27 and 28 extends axially inwardly from the radially outer edge of each portion 22 and 23. This design more effectively entraps the heat in the zone adjacent the weld 13.

In the preferred form, the heat shields 17 and 18 comprise a completely cylindrical tubular portion 19 or 21. However, in some instances it may be acceptable to employ a heat shield that comprises only a part cylindrical portion, for example a semi-cylindrical portion. Such part-cylindrical device may be used, for example, when the heating is to be applied to only a portion of the circumference of the pipe 11 or 12 or other article, for example when applying a patch on a holiday on a pipe coating.

The material of the blanket 24 and 26 may be any material which does not burn, for example NOMEX (trade-mark), and which has some thermal insulating property.

The heat shield 17 and 18 may be made of any material capable of withstanding direct impingement with a propane, butane, methane or natural gas flame of the type well known in the pipeline construction industry. Preferred properties of the material include rigidity, low weight, low specific heat, in order to allow rapid cool down, and ease of fabrication. Preferably, the heat shields 17 and 18 are made of sheet metal. Aluminium and magnesium alloys are ideal materials, because they are inexpensive, light and rigid, and combine very high thermal conductivity with low specific heat. Further, they are easily cut, shaped, machine welded and fastened.

The shields 17 and 18 are preferably formed in two pieces so that they can be clamped around the pipe. The two pieces may be hinged, or may be simply joined by simple fasteners such as bolts. In a preferred form, the two portions are connected together at an axial hinge about which the portions can pivot between an open position at which the portions can be applied on the article at a point intermediate its ends. This avoids the need to slide the heat shield axially along a pipe length from an accessible end. The two portions can be pivoted together to a closed position in which the half portions together extend around the girth of the article.

Figs. 3 and 4 show a two portion heat shield 17a wherein the cylindrical portion comprises two semi-cylindrical portions 19a and 19b, and the annular planar portion comprises two semi annular portions 22a and 22b. A semi-cylindrical fire resistant blanket portion 24a and 24b is connected integrally to a radially inner side of each portion 19a and 19b.

Portion 22b carries an offset tab portion through which passes a pivot pin 31 that also passes through the portion 22a. At an opposite side, the portion 22b carries an offset tab portion 32 having a circumferentially extending slot 33 in which is received a threaded stud 34 connected to the other portion 22a. A release nut 36 is threaded on the stud, and can be loosened, allowing the two portions 22a and 22b together with the portions 19a and 19b to be opened like a clam shell. The device is then placed around the pipe and closed, and the release nut 36 tightened.

CLAIMS:

1. A method for use in applying heating on a zone of an elongate tubular article comprising applying a heat shield on the article at each side of a zone to which the heating is to be applied, each heat shield comprising an at least partially cylindrical portion extending in a circumferential direction of the article and a planar portion extending radially outwardly from an inner end of the cylindrical portion.

2. A method as claimed in claim 1 in which the cylindrical portion comprises a cylindrical tube and the planar portion comprises an annulus.

3. A method as claimed in claim 1 or 2 in which the planar portion has an at least partially cylindrical edge flange extending axially inwardly from a radially outer edge thereof.

4. A method as claimed in any one of claims 1 to 3 in which each heat shield comprises two part cylindrical portions adapted to be connected together to extend around the circumference of the article.

5. A method as claimed in claim 4 in which said portions are connected together at an axial hinge about which the portions pivot between an open position in which said portions can be applied on the article at a point intermediate its ends, and a closed position in which the half portions together extend around the girth of the article.

6. A method as claimed in any one of claims 1 to 5 in which each said heat shield comprises heat resistant sheet metal.

7. A method as claimed in any one of claims 1 to 6 including interposing a fire resistant blanket between an

outer surface of the article and each cylindrical portion.

8. Apparatus for use in applying heating on a zone of an elongate tubular article, comprising two similar heat shields each comprising an at least partially cylindrical portion adapted to extend in a circumferential direction of the article and a planar portion extending radially outwardly from an inner end of the cylindrical portion.

9. Apparatus as claimed in claim 8 in which the cylindrical portion comprises a cylindrical tube and the planar portion comprises an annulus.

10. Apparatus as claimed in claim 8 or 9 in which the planar portion has an at least partially cylindrical edge flange extending axially inwardly from a radially outer edge thereof.

11. Apparatus as claimed in any one of claims 8 to 10 in which each said heat shield comprises heat resistant sheet metal.

12. Apparatus as claimed in any one of claims 8 to 11 in which each heat shield comprises two part cylindrical portions adapted to be connected together to extend around the circumference of the article.

13. Apparatus as claimed in claim 12, wherein said portions are connected at an axial hinge about which the portions pivot between an open position in said portions can be applied on the article at a point intermediate its ends, and a closed position in which the half portions together extend around the girth of the article.

14. Apparatus as claimed in any one of claims 8 to 13 including a fire resistant blanket connected to a radially inner side of the or each cylindrical portion.

15. A kit for use in applying heating on a zone of an elongate tubular article comprising apparatus as claimed in any one of claims 8 to 13 and in combination therewith a fire resistant blanket adapted to be interposed between an outer surface of the article and each cylindrical portion.

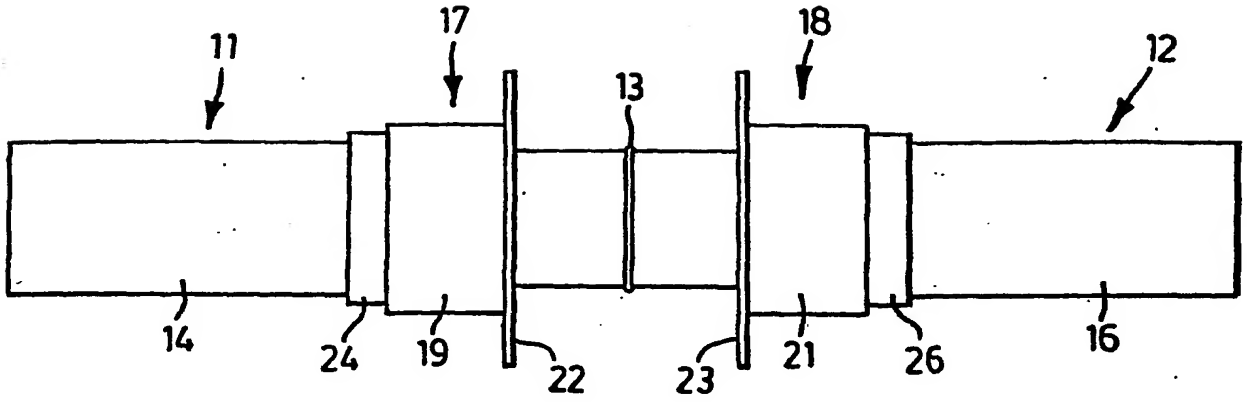


FIG. 1

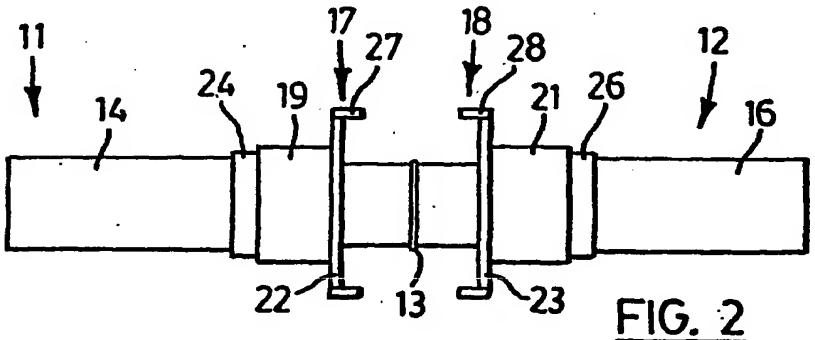


FIG. 2

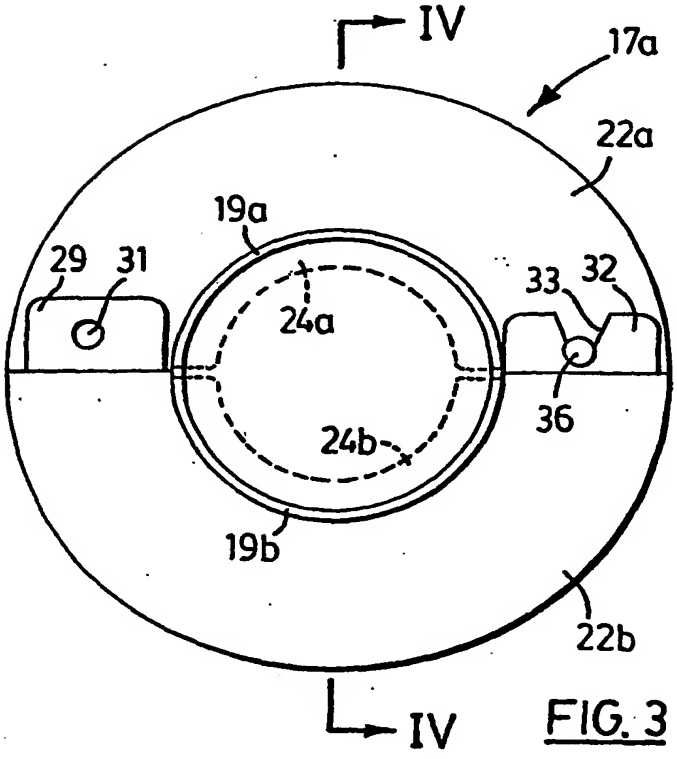


FIG. 3

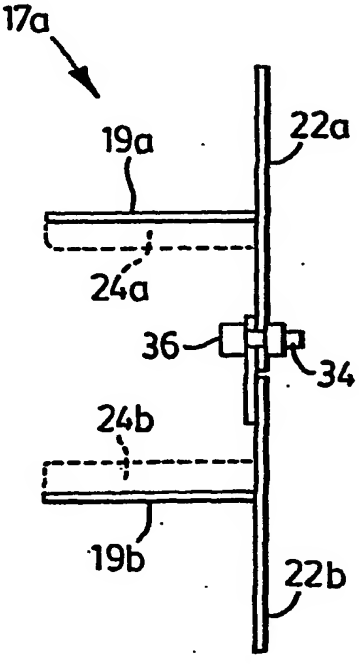


FIG. 4

INTERNATIONAL SEARCH REPORT

Ir ial Application No
PCT/CA 01/00781

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B23K37/053

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B23K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2 108 077 A (ROBINSON) 15 February 1938 (1938-02-15) column 2, paragraph 2; figure 4	1,4-6,8, 11-13,15
Y	US 5 655 699 A (MCGUSHION) 12 August 1997 (1997-08-12) column 4, line 16 - line 28 column 3, line 51 - line 63	1,4-6,8, 11-13,15
A,P	WO 01 34340 A (VERMAAT TECHNICS B.V.) 17 May 2001 (2001-05-17) page 8, last paragraph; figure 1	2,3,9
A	US 5 980 191 A (TRIBLE) 9 November 1999 (1999-11-09) the whole document	1-15

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents:

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 September 2001	18/09/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Herbreteau, D

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int ıal Application No
PCT/CA 01/00781

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2108077 A	15-02-1938	NONE	
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